

erty. Dayton, 21st, Miami river reached the high-water mark of the flood of 1881; no damage to property. Logan, 21st, Hocking river higher than for many years; bottom lands submerged. Gambier, 21st, river overflowed; railroad bridge carried away and much other property damaged. New Comerstown, 21st, incessant rain for the past four days. Tuscarawas river and its tributaries overflowed. Wheat fields submerged and fences swept away. Iron-ton, 21st, river 43 feet and 8 inches above low-water mark and rapidly rising. Circleville, 21st, Scioto river unusually high; 5 p. m., river within one foot of the highest point ever reached, and rising at the rate of one inch per hour. Heavy washouts on the railroads. Columbus, 20th, Scioto river rose rapidly during the day. 21st, river reached the highest point known for years; a number of cellars in northwest portion of the city were flooded. In some instances people were compelled to abandon their homes. A large quantity of lumber was washed away. *Pennsylvania*: Easton, 2d, Delaware river 23 feet above low-water mark and rising rapidly. River filled with lumber and broken rafts. The lower floors of mills in south Easton submerged and considerable damage done to the locks on the Lehigh and Delaware canals. Harrisburg, 21st, Susquehanna eight feet above low-water mark and rising rapidly. Paxton creek overflowed and much damage in surrounding country. Milton, 21st, heavy rain during past 25 hours caused serious washouts on Pennsylvania R. R. and west branch of Pennsylvania canal; streams considerably swollen; west branch of the Susquehanna river very high. *Tennessee*: Tiptonville, 24th, country flooded some distance from the river; buildings carried away and considerable stock drowned. Memphis, 20th, river remained above the danger-line throughout the month; all bottom lands submerged. The extent of territory in surrounding country endangered by the flood has been estimated as containing a population of 30,000. The estimated loss to the cotton crop has been put at 1,000,000 bales. The known loss in some particulars, attending the flood in this region is 30,000 head of stock and 50 human lives. Railroad travel is "terribly demoralized." *Texas*: Navazota, 10th, Navazota and Brazos rivers overflowed and hundreds of cattle drowned in the bottom lands. Dallas, 12th, almost incessant rain prevailed throughout eastern and northern Texas during the past week. Entire country flooded. People find it impossible to visit the towns for trade. Trinity river overflowed and 20 miles of the Texas and Pacific railroad washed away. Reports from all sections show that the rivers are higher than at any time since the great floods of 1852 and 1866. Large quantities of lumber, cordwood, household utensils, bridge timbers and farm implements, together with numerous small buildings and the bodies of dead animals, floated down the principal rivers and their tributaries. Heavy washouts reported on all railroad lines, and most of them abandoned regular trains. The Brazos river overflowed to an unprecedented extent. Scores of country bridges washed away. Reports from Fort Worth state that Trinity river still continues to rise. Corsicana, 3d, very heavy rains continued without much interruption during the past three weeks. During the night two serious washouts occurred on the Texas and St. Louis railroad. Much other damage in surrounding country. Grapeland, 3d, rain has fallen incessantly for several days past. Water courses higher than for the past 20 years. *Vermont*: St. Albans, 2d, Misisqual, Lamville and Minoski rivers overflowed, causing much damage to private and corporate property. Railroad travel suspended. Rivers very much swollen throughout the northern portion of the State. *Virginia*: Petersburg, 14th, in consequence of high water all mills practically ceased operations. Appomattox river higher than for the past five years; water still rising. *West Virginia*: Wheeling, 19th, river 19 feet and 9 inches above low-water mark and rapidly rising. *Washington Territory*: Pomeroy, 28th, snow melting in the mountains, caused a sudden rise in streams; portions of the town were flooded. *High Tides*.—Delaware Breakwater, 21st, unusually high. Chincoteague, Va., 18th, unusually high at 8 a. m.; 21st,

very high from 10 to 11 a. m. Indianola, Tex., 18th, 19th, 20th, 24th, 25th. New York, 21st, very high. Plymouth, Mass., 22d, 3 p. m., violent northeast gale, accompanied by the highest tide for many years. The water invaded the streets and cellars and considerable damage was done at the lumber yards. At one of the yards a large bulk-head was torn away and left in ruins. Swampscott, Mass., 23d, remarkably high tide, overflowing some of the streets. On some parts of the beach the waves dashed to the second story windows of neighboring dwellings. Highest tide for many years. Revere Beach, Mass., 21st, tide so high that it damaged the theatre building, nearly undermining it.

TEMPERATURE OF WATER.

The temperature of water, as observed in rivers and harbors at Signal Service stations, with the average depth at which observations were taken, is given in the table on the left-hand side of chart No. III. Owing to the presence of ice or the breakage of instruments, observations are wanting as follows: Alpena, 1st to 15th, 21st to 28th; Cleveland, 1st to 10th; Detroit, 1st to 5th, 11th, 12th, 19th to 28th; Duluth, 22d to 28th; Escanaba, throughout the month; Buffalo, 1st to 12th, 23d to 26th; Sandusky, 1st to 12th, 23d to 28th; Chicago, 1st to 5th, 24th; San Francisco, 21st; Marquette, 5th to 28th; Burlington, throughout the month; Milwaukee, throughout the month; Toledo, 1st to 14th; Chincoteague, 21st to 28th; Provincetown, station opened on the 15th; Portland, Me., report too late for publication.

ATMOSPHERIC ELECTRICITY.

Auroras.—The display of the 17th, the most important of the month, was observed from Sydney, N. B., westward to points in the Upper Lake Region (Grand Haven being the most westerly) and southward to Atlantic City, N. J., the following stations reporting: Bangor, Me., from 10 p. m. until day-break of 18th. Cornish, Me., all night, altitude from 10° to 15°. Dexter, Me., very bright, no beams. Orono, Me., during the evening. Gardiner, Me., 8 p. m. Mt. Washington, 8 p. m. until a. m. of 18th, a faint light of yellowish white color. Burlington, Vt., from 7 to 11.45 p. m. diffuse light, extending upward 30° from the horizon; no streamers or dark segment. Lunenburg, Vt., and Amherst, Mass., during the evening. Westborough, Mass., 7 to 9 p. m. Williamstown, Mass., 10 p. m., bright band of light in northern horizon; altitude about 5° and stretching through 30° azimuth. Fall River, Mass., 9 p. m., to midnight. Harvard College, Cambridge, Mass., auroral arch bright and broad; not seen early, but thought to be visible about 7.30 p. m.; distinct, later; some streamers about 10.30 p. m. Springfield, Mass., first seen at 7.25 p. m. as a mere glow in the west; at ten p. m. it was visible in the north, and until 11.30 p. m., when last observed. Newport, R. I., from 8.30 to 10 p. m., faint, altitude about 10°; azimuth, 45°. New Shoreham, R. I., from 8 to 11.50 p. m. brilliant; it formed an arch about 15° above the northern horizon and 10° in width; well defined luminous beams were exhibited, and often bright flashes of light would extend from 30° to 40° above the horizon. Southington, Conn., diffuse light. Toronto, Can., during the evening. Rochester, 9.30 p. m., dim aurora with a dark segment of 5° altitude, no streamers visible. Waterburg and Ardenia, N. Y., during the evening. Freehold, N. J., 8.45 to 9.30 p. m. low aurora, only a white glow; altitude 10°. Somerville, N. J., during the evening. Moorestown, N. J., low sheet aurora. Readington, N. J., during the evening. Atlantic City, 9 p. m., faint low aurora. Fallsington, Pa., 9 p. m. Mount Forrest, Can., during the evening. Alpena, Mich., 10.30 to 11.30 p. m., aurora consisted of diffuse light without streamers. Thornville, Mich., 8.30 p. m., no rays; merely a dull diffused light, 20° above the horizon; when last observed, at 10.30 p. m., it remained unchanged. Grand Haven, Mich., 8.30 to 9.30 p. m., faint aurora in northern sky; had the appearance of morning dawn; altitude 5°, azimuth,

20°. Lafayette, Ind., aurora flashing up in the north to a height of 30°, resembling faint sheet lightning. The display of the 8th was reported by the following stations: Eastport, Me., from 9.30 to 11.30 p. m., faint aurora appeared in northern horizon, altitude 15°, color, very faint bluish white. Orono, Me., during the evening. Dexter, Me., bright arch. Gardiner, Me., 9.15 to 11.15 p. m., faint aurora. Burlington, Vt., 7 to 11 p. m., faint aurora; no prominent features. Woodstock, Vt., 9 p. m., faint nebulous light rising 15° or 20° above the horizon. Harvard College, Cambridge, Mass., fine aurora with streamers in the evening; traces visible at 11 p. m. North Volney, N. Y., 9 p. m., brilliant streamers. Ithaca, N. Y., faint auroral light, no striking features. Friendship, N. Y., during the evening. Waterburg, N. Y., 9 p. m., diffuse light in the north, some faint streamers. Toronto, Can., during the evening. Fort Brady, Mich., 9 p. m. Alpena, Mich., 8 to 11.25 p. m., consisting of a diffuse light without streamers. Northport, Mich., 8.20 p. m., consisting of arch of 15° altitude, most brilliant in the northeast. New Corydon, Ind., 5 a. m. St. Vincent, Minn., from 7.30 to 9 p. m., several beams of light extended to a height of from 7° to 10°, but owing to a bank of stratus clouds along the northern horizon, their brilliancy and characteristics were indistinct. Bismarck, Dak., 9 to 11 p. m., appeared as a nebulous light, elevation about 8°. The display of the 5th, was reported by the following stations: New Shoreham, R. I., 7.50 to 9 p. m., faint aurora in the form of an arch, about 15° above the northern horizon and 8° in width. Southington, Conn., 8 p. m. Marquette, Mich., 7.15 to 7.35 p. m., faint aurora. Manitowoc, Wis., during the evening. New Corydon, Ind., 6.30 to 7 p. m., bright white segment, altitude 10°, extension 60°. Riley, Ill., 7.30 p. m., arch 4° broad, altitude 12°; disappeared before 9 p. m. Elmira, Ill., from 7 to 8 p. m. Cresco, Ia., 6.30 to 6.45 p. m., faint aurora; patches of light, forming portions of an arch, and constantly shifting. St. Paul, Minn., 9 p. m., until after midnight; diffuse light of pale yellow, changing to bright orange and pale green; at 11 p. m., there was a well defined arch 15° above northern horizon, from which slender luminous columns shot up towards the zenith with a wavy motion from left to right; they resembled merry dancers. The display of the 6th was reported by the following stations: Dexter, Me., during the evening. Newport, Vt., during the evening. Buffalo, 1.45 a. m., became visible during temporary break in the clouds; it was observed for $\frac{1}{2}$ hour, no well defined arch was formed, it being broken and consisting of numerous bright beams, some extending to an altitude of 30°. Its horizontal limit was from NW. to NE. and was about 8° above the horizon. The whole display had a slight movement from W. to E. Cleveland, O., 11 to 11.30 p. m., diffuse light of straw color; no streamers. Milwaukee, 1 a. m., diffuse light. The following isolated displays were reported: Eastport, Me., 23d, 11 p. m., to midnight, extending from NW. to NE., and to an altitude of 30°. It was so nearly obscured by clouds that no peculiarities were detected. Gardiner, Me., 18th, low diffuse arch; not visible until after 9 p. m. Harvard College, Cambridge, Mass., 11th, 11.30 p. m., faint trace of aurora low down in the north. New York, 28th, 7 p. m., faint aurora, visible until 7.50 p. m., when the sky became obscured by clouds. It appeared as a horizontal light and was characterized by recurring fits of brilliancy; its color was at first, a pale red and later, a bright red. It appeared about 20° E. of N, covering 20° azimuth, and extended about 20° above the horizon; its centre or crown extended upward about 30°. Catawissa, Pa., 18th. Toronto, Can., 9th. Lansing, Mich., 9th. New Corydon, Ind., 10th, 1 to 3 a. m., strong auroral light. Manitowoc, Wis., 9th, 9.30 p. m., with arch; 13th, 11 p. m., with arch. Embarrass, Wis., 12th, 8.30 p. m., faint aurora. Beloit, Wis., 9th. Cresco, Ia., 10th, midnight, faint light in horizontal lines from NW. to NE., probably an aurora. Clinton, Ia., 9th, from early evening till 9 p. m.; it presented the beams usually seen, with a wavy motion. Monticello, Ia., 19th, 10 p. m. Clay Centre,

Kan., 22d, 10 p. m. St. Vincent, Minn., 7th, 8 to 10 p. m., pale diffuse light; 9th, 7 to 10 p. m., brilliant light of greenish color with beams resembling merry dancers; altitude 6° to 15°. Ft. Stevenson, Dak., 12th, 8 to 8.45 p. m., 2 arches, parallel to each other. Ft. Assinnaboine, Mont., 20th, first seen at 4 a. m. and ended at 7 a. m.; observed again in the evening, and remained visible until obscured by clouds at 11 p. m.; at 10 p. m., beautiful streamers in large numbers shot upward to a height of 45°, appearing and disappearing in rapid succession. Both auroras extended from NNW. to ENE., azimuth 45°; altitude 25°. Ft. Benton, Mont., 18th, 9 p. m.; 19th, 9 p. m.

Thunder Storms.—They were reported in the various districts on the following dates: New England, 21st; Middle Atlantic States, 21st, 28th; South Atlantic States, 4th, 8th, 9th, 14th, 18th, 21st, 28th; Florida Peninsula, 9th, 28th; East Gulf States, 3d, 8th, 15th, 27th, 28th; West Gulf States, 2d, 3d, 7th, 8th, 12th, 14th, 15th, 19th, 20th, 24th, 25th to 28th; Rio Grande Valley, 2d, 19th, 27th; Ohio Valley and Tennessee, 8th, 12th, 16th to 21st, 23d, 27th, 28th; Lower Lake Region, Hudson, Ohio, 19th; Upper Lake Region, Kalamazoo, Mich., 12th, 13th; Upper Mississippi Valley, 12th, 13th, 16th to 20th, 27th, 28th; Missouri Valley, 7th, 12th, 16th to 21st, 24th to 28th; Middle Slope, 7th, 8th, 12th, 15th, 16th, 19th, 20th, 27th, 28th; Southern Plateau, La Mesilla, N. M., 2d.

Telegraphic Communication interfered with by Atmospheric Electricity.—Chincoteague, Va., 28th, kept up a continuous rattle for about two hours. Ft. Supply, Ind. Ty., 19th, during a. m. showers of sparks shot across the switch-board. Ft. Reno, Ind. Ty., 19th.

OPTICAL PHENOMENA.

Solar halos have been observed in the various districts on the following dates: New England, 4th, 5th, 9th, 15th, 16th, 17th, 20th, 23d, 25th, 26th; Middle Atlantic States, 1st, 2d, 3d, 7th, 8th, 11th to 14th, 16th, 17th, 25th, 26th; South Atlantic States, 2d, 13th, 25th, 26th; Florida Peninsula, Cedar Keys, 19th; Ohio Valley and Tennessee, 1st, 3d, 4th, 6th to 11th, 13th to 19th, 25th, 26th, 28th; Lower Lake Region, 6th to 9th, 11th, 15th, 25th to 28th; Upper Lake Region, 1st, 2d, 4th, 6th, 11th, 12th, 17th, 19th, 22d, 24th; Extreme Northwest, 1st, 6th, 16th, 23d; Upper Mississippi Valley, 3d, 4th, 6th, 8th, 10th, 12th, 14th, 15th, 17th, 18th, 19th, 21st, 22d; Missouri Valley, 3d, 4th, 10th to 15th, 24th, 25th, 28th; Northern Slope, Ft. Assinnaboine, 15th; Middle Slope, 3d, 6th, 10th, 12th, 14th, 24th, 27th; Northern Plateau, Umatilla, Or., 3d, and Dayton, Wash. Ty., 17th; Middle Pacific Coast Region, 1st, 2d, 3d, 9th, 15th, 23d, 24th, 26th; South Pacific Coast Region, 5th, 7th, 27th.

Lunar halos have been observed in the various districts on the following dates: New England, 1st, 2d, 3d, 5th, 20th, 23rd, 25th, 26th; Middle Atlantic States, 1st to 7th, 24th, 25th, 26th; South Atlantic States, 7th, 11th, 20th, 25th to 28th; Florida Peninsula, 2d, 3d, 25th, 28th; East Gulf States, 1st, 7th, 24th, 26th; West Gulf States, 1st, 11th, 23d, 26th; Rio Grande Valley, Eagle Pass, 27th; Ohio Valley and Tennessee, 1st to 4th, 6th, 7th, 8th, 11th, 24th to 28th; Lower Lake Region, 1st to 7th, 24th to 27th; Upper Lake Region, 1st, 3d, 4th, 24th, 25th, 27th, 28th; Extreme Northwest, 1st, 5th, 23d, 24th, 26th, 27th, 28th; Upper Mississippi Valley, 1st, 2d, 3d, 7th, 8th, 9th, 13th, 21st, 24th, 26th, 28th; Missouri Valley, 1st, 2d, 4th, 6th, 8th, 10th, 24th, 25th, 26th, 28th; Northern Slope, 1st, 2d, 22d to 26th, 28th; Middle Slope, 3d, 5th, 24th, 25th, 27th, 28th; Southern Slope, 6th, 26th, 27th; Southern Plateau, 3d, 4th, 5th, 8th to 11th, 23d, 24th, 25th, 27th; Middle Plateau, 5th, 23d to 26th; Northern Plateau, 1st, 22d, 23d, 28th; North Pacific Coast Region, Olympia, Wash. Ty., 3d, and Roseburg, Or., 2d; Middle Pacific Coast Region, 3d, 4th, 5th, 15th, 16th, 20th, 26th; South Pacific Coast Region, 3d, 4th, 5th, 23d, 24th.

Mirage.—Indianola, Tex., 4th, 8th, 9th. Huron, Dak., from 7 to 8.30 p. m., "making the plains, which were covered with snow, appear like vast perpendicular walls with horizontal tops."